DELHI MUNICIPAL BUS TRANSPORT

(A STUDY OF SOME ASPECTS)

INDIAN INSTITUTE OF PUBLIC ADMINISTRATION
INDRAPRASTHA ESTATE, RING ROAD
NEW DELHI-1

FOREWORD

The traffic problems of cities are being increasingly studied by students of Public Administration as an important aspect of their subject. But, in India, adequate attention has not been paid so far to them. The problem in Delhi is particularly important in view of its metropolitan status and of its rapid growth in the last ten years.

Toward the end of 1957 the Indian Institute of Public Administration in consultation with Shri A.D. Pandit, Chief Commissioner, Delhi, appointed a Study Group to examine and report on the administrative aspects of the Delhi Municipal Bus Transport system. The Group was formed under the chairmanship of Shri Gopi Nath Aman, Chairman, Public Relations Committee, Delhi Administration; Shri L.C. Kripalani, State Motor Transport Controller, Delhi Administration; and Mr. C.W. Scott, till recently Traffic Manager of Delhi Transport Service; with Shri Tejbir Khanna, Assistant Director, Central Road Research Institute, Delhi, and Traffic and Transport Consultant to Delhi Administration, as member-secretary and myself also as a member. Shri B.D. Raheja, of the Research staff of the Institute, assisted in the work of the Group. Shri Tejbir Khanna carried out the field survey, analyzed he replies of the questionnaire and drafted the report. The Institute is grateful to Shri S.R. Mehra, Director of Central Road Research Institute, for permitting Shri Tejbir Khanna to work in the Group as well as for other help rendered. We are grateful to Mr. Walter P. Heddan, Transport Consultant, Ford Foundation, who was in India during the earlier part of its work, as well as to the officers of the Town Planning Organization, for attending our meetings and giving us useful suggestions. Shri S.B. Bapat, I.C.S. (Retd.), was of special help to us, during the time that he was in the Ministry of Home Affairs, in circulating the questionnaire to different offices of all the Ministries of the Government of India. Thanks are due also to the Delhi Road Transport Authority, now the Delhi Transport Undertaking, Municipal Corporation of Delhi, for the interest shown in our work.

The Institute is indebted to the Chairman and members of the Group for the time and experience they have contributed to the work. The Institute is particularly indebted to Shri Gopi Nath Aman for the wise guidance he gave in the work of the Study Group and for the time he found for the purpose. In view of his long and great experience of the problems of Delhi in different respects, his chairmanship was most valuable. In a letter to me he writes, "It was a pleasure and a privilege to be associated with the members of the Group, all of whom had more technical knowledge than myself." I am sure that all other members of the Group will agree that it was equally a pleasure and privilege for them to work under his chairmanship. As Mr. C.W. Scott went abroad before the final draft of the Report was ready, and is still away, his signature does not appear in the Report; but he had agreed to the preliminary draft. I hope that this Report will prove of interest and useful to a wide public.

V.K.N. MENON
Director

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Administration

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I

INTRODUCTION

The Delhi Municipal Bus Transport system has never been able to meet all the demands made on it. On account of the lack of satisfactory transport facilities in Delhi, the public are inconvenienced in more than one way.

It is now necessary that a fresh scientific approach be made to cope with the problem. At present the demand for the bus transport, and other cheap and fast type of transport, seems to be far higher than the facilities available as has also been indicated by a survey of 'Hire Transport in Delhi'* carried out in May 1958.

The scope of this study is restricted to the municipal bus transport service in Delhi which was known as Delhi Transport Service (D.T.S.) before the Delhi Corporation came into existence. Now it is known as the Delhi Transport Undertaking (D.T.U.).

It has not been possible to cover all aspects of the D.T.U. in this study, but the main idea was to cover those aspects which directly affect the public, traffic and the operation of the buses.

The different chapters of this report deal with (*i*) past development, which created certain traffic and transport problems, (*ii*) past development and expansion of the Delhi Transport Undertaking (D.T.U.), (*iii*) rush hour problem, (*iv*) problems of dead mileage, low income routes, low average speed and public convenience, (*v*) the D.T.U. finances, (*vi*) tramways of Delhi, and (*vii*) planning for future expansion of Delhi keeping the transport problem in view.

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* Hire Transport Survey Report by Tejbir Khanna submitted to the Chief Commissioner, Delhi, in May 1958.

II

DELHI—HISTORICAL

The city of Delhi was founded by the Pandavas around 1400 B.C. and it has been the ancient and historical capital of India for centuries. On the plains of Delhi are the ruins of six or more cities that at one time or another were the capital of kingdoms or empires.

The different empires left various monuments in this city. Shahjahan, the Moghal emperor and the builder of the Taj Mahal at Agra, got the Red Fort and the Jama Masjid built in Delhi.

The East India Company located its capital at Calcutta, but the British Government later changed the capital to Delhi in 1912. At that time an entirely new city was built to house the capital. This new city is known as New Delhi. The two cities developed separately instead of growing into one unit. This was due to lack of integrated planning. Consequently, the connecting roads between the two areas were lacking. New Delhi area was well planned with wide roads, whereas the old city was neglected and no effective measures were taken to control the growth of slums and of congestion. Today, many roads and lanes can be found in old Delhi and in most parts they cannot be widened.

Delhi today has a population of about 1.8 million. There have been several factors for the growth of Delhi. Delhi has been an important centre from early times as a capital city with historical importance. It has always had the advantages associated with a capital city. New Delhi is a focal point in the railways system and highways system with most of the Central Government offices located in New Delhi. The importance of Delhi as a market cannot be fully measured by its population alone as its atmosphere, with all the foreign embassies, is cosmopolitan and not provincial. More and more, Delhi is becoming a place of opportunity and adventure for private enterprise and for those seeking employment. About 70,000 people are coming to Delhi from surrounding areas and settling down in the city every year. There is every reason to believe that Delhi will continue to grow and it would not be possible to stop the growth of Delhi.

In 1947, when partition of the country took place more than half a million refugees moved into Delhi making its population about three times its original size. This was the time when most of the haphazard growth was added on to New Delhi area as well. Many new unplanned colonies sprung up suddenly. Roads or transport were not planned to meet the current or future public needs.

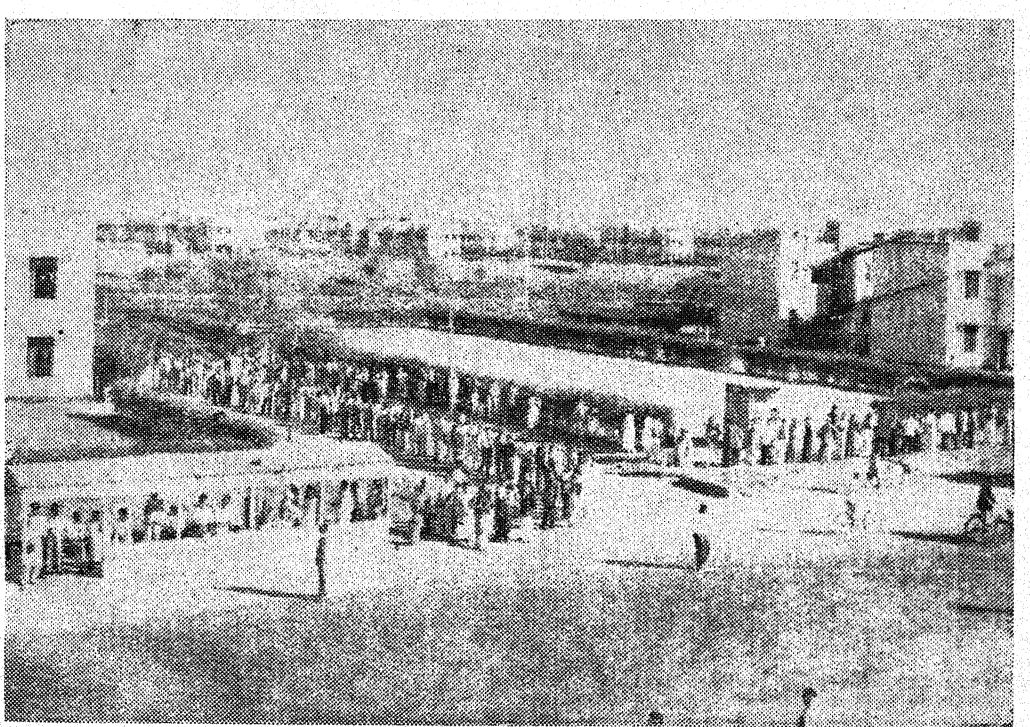
III

DELHI TRANSPORT PROBLEM

It is estimated that over five lakhs of persons travel from home to work, shopping, school, etc., in Delhi every day. Most of the travel is in the north-south direction. With return movement back home, it makes a total of about 1,045,000 passenger trips per day in Delhi. More than half of these passenger trips are made by public transport and 'for hire vehicles'. This is a tremendous rise over pre-partition time passenger trips.

There are several factors which have given rise to Delhi's acute transport and traffic problems, *e.g.*, (*i*) the sudden rise in population soon after partition; (*ii*) unplanned expansion of the Delhi urban to settle the refugee population—ribbon development; (*iii*) rising demands of transport as the refugees settled down and found jobs; (*iv*) general rise in per capita income in Delhi; (*v*) all types of vehicles coming to the roads to meet these transport demands creating a mixed traffic complex; (*vi*) functional obsolescence of roads, built for light traffic which are unable to carry big buses; (*vii*) concentration of Government offices in particular areas; and (*viii*) lack of road sense on the part of the road users.

Over 45% of all employment in Delhi is governmental. Offices of most of the private establishments also open at 10 A.M. and close down at 5 P.M. As a result,



Long queues of passengers waiting for buses during rush hours

there is a great demand for public transport during these hours. Long queues of waiting public, great rush of all types of traffic creating congestion can be witnessed during these hours. Buses run fully loaded and sometimes beyond capacity. The frequency of buses is far less than the public demand during these hours and queues are broken in search of accommodation in the buses.

Due to shortage of buses enough of them cannot be plied on all routes and on some routes, due to shortage of patronage, frequency of the bus service cannot be increased for economic reasons.

The Delhi public want better, more efficient transport service without enhanced cost. The present inadequacies of the D.T.U. in the Delhi urban area have stimulated a wide variety of efforts on the part of private enterprise.

Motor-cycle rickshaws and two-seater scooters showed their appearance for the first time in Delhi during the past few years. But in spite of this, progress towards resolving fundamental problems is not impressive. There have been several reasons for this: (*i*) Action to provide roads, parking and the transport service is taken independently without any definite overall concept. (*ii*) Current methods of finance have not been able to meet the extraordinary requirements of road modernization, terminal developments, bus stations and mass transport operations; more effective financial tools should be adopted to raise the necessary financial support. (*iii*) Most efforts have been concentrated on the supply side of the problem. Analysis of all factors underlying transportation demand has not been paid enough attention.

The congestion of streets and the rush hour madness of D.T.U. buses to satisfy the long waiting queues and platoons of cyclists inching their way through congested roads and traffic circles are a few manifestations of a continuing imbalance between transportation demand and the available transport capacity.

IV

DELHI BUS SERVICE

The Delhi Transport Undertaking (D.T.U.) has taken over the nationalized transport system in Delhi after the fourth phase of control. Bus services in Delhi were initiated by the erstwhile Gwalior Northern India Transport Co. Ltd. which handed over a poor set of vehicles to its successors—The Ministry of Transport. The position during this regime did not materially solve the transport problem in Delhi, and notwithstanding the influx into Delhi of refugees after 1947, which grew to great dimensions by 1951, very little progress had been made in respect of workshop and garaging facilities and the fleet was mostly of vehicles run on petrol and was also not fit enough to be on the road.

Dieselisation of the fleet started in the year 1952 and this programme is continuing. There were in the beginning no depots to speak of for housing the diesel fleet, nor were the workshop facilities expanded to meet the highly technical skill required for the maintenance of the diesel fleet and the buses were operated from the same two units—one of which has been given up and the other is to be replaced by the Indraprastha Depot, scheduled to begin functioning at an early date.

The Delhi Road Transport Authority took over on July 1, 1950, under an Act of Parliament, and nothing very substantial was done to improve the general affairs of the transport system in Delhi till the year 1952 when two depots—one in Vinay Nagar and the other at the Coronation—were put up and opened in 1953 in a correct location to meet the position of outshedding and inshedding of buses. Steps were also taken from 1952 onwards to codify rules, regulations and procedures with a view to formulating some standard of efficiency and guidance to the staff, as a result of which a complete set of Executive Instructions and Regulations was issued.

The bus management was renamed as the D.T.U. under the Act of Parliament constituting the Municipal Corporation of Delhi on February 7, 1958. Thus, it will be seen, that in the course of time the D.T.U. has passed through four different managements. It is hoped that early in 1959 there will be four well-equipped depots and one central workshop to meet the requirements of an expanding fleet which in time will be called upon to meet the requirements of the public.

There has been much criticism levelled against the D.T.U.,—a good percentage of which is certainly correct,—but the D.T.U. unlike in Bombay, Madras and Calcutta, has no tradition of continuity of thought and planning. It is only recently that it has been realised that the Delhi Transport Undertaking has a vital part to play in the progress of inner and outer Delhi and that local bodies and building engineers have to provide sufficient road space, parking areas, bus stands, loops, etc., in their future plans so that the large and expensive vehicles which are being added to the D.T.U. fleet can be safely and efficiently operated.

The town planners and road builders have only recently become conscious of the growing requirements of an expanding transport concern. Provision now is being made in all residential and housing colonies for the acceptance of stands and facilities to make it possible to operate a public bus service.

The mass transport service of Delhi has been gradually expanding during the past few years to meet the rising demands of the public. But, field observations show that the public demand has far outstripped the expansion in the mass transport service.

The following table shows the yearly expansion of the Delhi Transport Service

Year	Average daily bus miles	Average passengers carried daily	Av. No. of buses per day	Average earning per bus mile	Average expend. per bus mile	Total income per year	Total expend. per year
50-51	19,014	79,293	142	0-15- 3	1- 1- 0	6,210,000	6,829,000
51-52	20,484	85,631	163	0-15- 0	1- 0- 4	6,697,000	7,252,000
52-53	20,740	97,850	195	0-15- 9	0-15- 7	7,805,000	7,377,000
53-54	23,007	1,10,469	187	0-15- 5	0-15- 7	8,489,000	8,174,000
54-55	24,700	1,27,254	199	1- 0- 6	1- 0- 0	9,339,000	9,014,000
55-56	26,670	1,67,415	246	1- 0-11	0-15- 9	12,036,000	10,903,000
56-57	34,548	1,93,396	287	1- 1- 0	1- 0- 7	13,738,000	12,723,000
57-58	39,559	2,22,092	330	1.06	1.03	15,361,533	14,800,160

One hundred and thirty-four new buses, the 'World Master' type, have been received during June '57-January '58 @ Rs. 76,000 a bus. At present, out of the fleet of 534 buses 367 are running on roads every day. It is expected to increase the fleet strength to 731 buses by March 1961.

V

THE RUSH HOUR PROBLEM

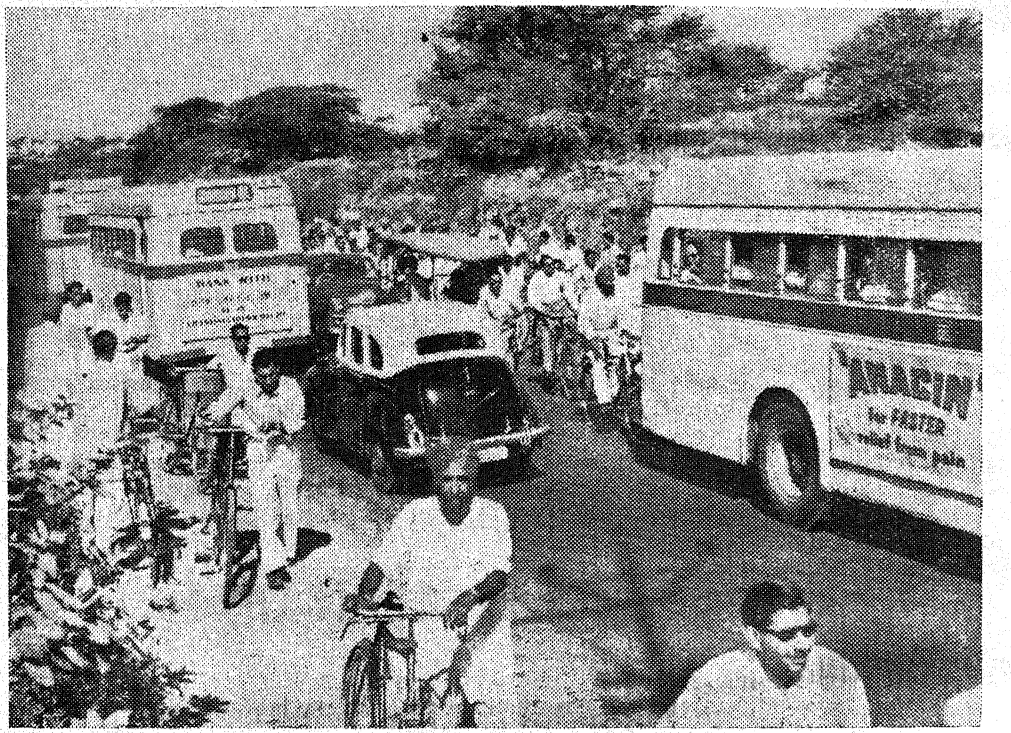
Investment in public transport plant and equipment is determined mostly by peak hour requirements. The number of employees is also fixed largely by peak hour standards. This results in a carrying capacity which cannot be usefully employed during non-rush hours.

There is a great demand for public transport during morning and evening peak hours. It is estimated that about 70% of total passenger trips by D.T.U. buses are concentrated during a short period of the so-called peak hours, *i.e.*, from 9 to 11 A.M. and from 5 to 7 P.M. During these hours, there is a rush of passengers to and from the areas where government offices are concentrated, *e.g.*, the Central Secretariat, Shahjahan Road, the Supply Offices, and the Udyog Bhawan and nearabout areas—as shown in the map by a cordon line enclosing the office concentration area (OCA) in New Delhi. Appendix I shows desire lines of travel from different parts of Delhi to the O.C.A. where it is most difficult for the D.T.U. to cope up with the public demand.

There can be two methods of meeting this peak hour problem, *e.g.*, (*i*) either more buses may be brought on the road, or (*ii*) public demand may be evened out over a longer period. Whereas every effort should be made to bring more buses to meet the public requirements, it must also be viewed clearly that the ultimate solution does not consist in adding on an unlimited number of buses to the existing fleet. Unlimited number of buses would create congestion for want of road space, besides their high capital and maintenance expenditure. So, the solution of this problem seems to be more in its 'demand aspect' than in its 'supply aspect'. To spread the demand peak over a longer period by staggering of working hours can help considerably.

A field study was carried out in this connection and it was found that the peak hour rush problem was acute in the 'Office Concentration Area' at the Central Secretariat, the Supply Offices and the nearabout areas. School hours, college hours and closing down time in commercial areas are different from government office hours. This automatically offers a relief to D.T.U. during peak hours of office rush. The office concentration area, where the peak hour rush problem is acute, is shown enclosed by cordon line in the map. Offices in this area were divided into sixteen groups as shown in the list given in Appendix II. Questionnaires were circulated through the Home Ministry in these offices to all the employees up to the rank of Section Officer (*i.e.*, up to the salary of about Rs. 750 per month) as it was estimated that most of the employees drawing a higher salary do not use the Delhi Transport Undertaking buses for coming to office. Questions asked were about the mode of conveyance and place of residence. Places of residence were grouped together in conformity with the zones planned for the 'Origin-Destination' Traffic Survey carried out by the Town Planning Organization and the Central Road Research Institute in October 1957. About 95% of the questionnaires were returned. The questionnaires were analysed to find out the volumes of traffic by D.T.U. buses and cycles originating from different zones and going to different offices as grouped. The table in Appendix III shows the volumes of traffic by buses and by cycles from origin zones to the destination group of offices in the Office Concentration Area. The total volumes emanating from different residential zones and going to the office concentration area are shown as travel lines (thickness corresponding to the volumes) in the map.

As may be seen from the desire lines map of Delhi (Appendix I), heavy volumes of traffic by buses and cycles originate from 'zone 31-Lody Colony', 'zone 4 Subzimandi area', 'zone 15-Gole Market area', 'zone 8-Rajendra Nagar area', 'zone 11-Chandni Chowk area', 'zone 12-Daryaganj area', 'zone 14-Paharganj area', 'zone 13-Minto Road-Ranjit Singh Road', 'zone 25-Moti Bagh area', 'zone 38-Malaviya Nagar', 'zone 30-Nizamuddin and Bhogal', 'zone 40-Shahdara', 'zone 23-Najafgarh area' and 'zone 10-Qutab Road area'. The volumes of traffic from other zones to the office concentration area can be seen from the table in Appendix III.



During rush hours cycle traffic on many roads makes it impossible for the buses to operate efficiently

Within the OCA, the total number of employees coming by buses is 9,889 and those coming by cycles is 28,996. On an average, a bus carried about 60 passengers during peak hours. This means that about 180 buses are required to pick up passengers from different localities to this area alone during the morning and the same number of buses are required to drop them back in the evening. When all these buses along with other traffic and about twenty-nine thousand cyclists move into or out of this area in the morning and in the evening respectively, many roads leading to this area are congested.

If the office hours were staggered in such a way that half the employees have to reach their offices in the morning at one time and the other half after a suitable interval and in the evening again if they leave their offices at a similar time only half as many buses would be required to carry the same number of passengers. But the number of the required buses can be reduced to half only if the interval between the two sets

of office hours (opening and closing) is long enough to permit the buses to complete one round trip between the points of origin and the destination point, *i.e.*, the office group.

The data were further analysed in such a way that about half the employees fall into each part and also about half the office-goers from each zone fall into each part. Preferably there should be a geographical boundary separating these two parts so that the public may not be inconvenienced in finding the timings of a particular office after the hours are staggered.

As may be seen from the map practically all origin zones of heavy traffic volumes are not more than 6 miles away from the Office Concentration Area and about 85 to 90% of all origin zones are within this distance from the destination area of offices. Six to seven miles mean about half an hour away by a bus.

Since the buses after dropping passengers would have to go back to the origin zones on their routes to bring back the other half of the employees (coming by buses) for the second set of office hours, there should be a difference of at least one hour between starting and closing down of two sets of office timings.

Keeping the above mentioned considerations in view, the office groups have been combined under two parts. Part A may have office groups 1, 2, 3, 4, 11, 12, 21, 22, 23, and 24 and Part B may have office groups 5, 6, 7, 8, 9 and 10. With this division, Part A, which falls on the north side of Kingsway, will have 4,771 employees coming by buses and 13,482 by cycles, and Part B, which falls on the south side of Kingsway, will draw 5,118 bus passengers and 15,514 cyclists at office time. If offices under Part A (the names of these offices may be seen from the list of office groups in Appendix II) are opened at 9-30 A.M. and those under Part B are opened at 10-30 A.M., practically only half the number of D.T.U. buses would be required to serve the same number of passengers more conveniently. Rush on bus stops will be appreciably reduced and congestion of roads will also be reduced considerably.

It may be pointed out that it has not been possible to stagger office hours in a way that a particular Ministry and all its attached offices may necessarily have the same set of timings.

After the second trip of the buses to Office Concentration Area (OCA), all these buses are not required for normal hour duties. All these buses would be required only in the evening again. It is estimated that if parking area to park about 60 buses is made available, a good percentage of the dead mileage involved in taking away these buses after the morning peak hour and bringing them back for the evening peak hour would be saved. At night time, this parking area can be used by some buses which pass by this area on their way to the depot after the last duty. Dead mileage would be saved on these buses also.

Parking reservation for about 60 buses should be sufficient within the OCA, preferably at three different locations.

VI

SOME GENERAL CONSIDERATIONS

DEAD MILEAGE ON BUSES

At present, there is a high percentage of total travel going as dead mileage. There are several reasons for that, *e.g.*, (*i*) After the buses unload passengers destined to their offices or other places of work they run almost empty on their way back; (*ii*) In the evening again they have to go almost empty to the spots of passenger concentration area; (*iii*) At night time, dead mileage is incurred after the last duty; (*iv*) In low population-density areas too few seats are occupied.

The remedy for reducing dead mileage lies in suitably locating bus-parking areas near the concentrated destination points for working people, *i.e.*, office areas, industrial areas, etc. If parking facilities for buses is given, some of the buses bringing passengers to these points during the morning peak hour can be stored at the spot for duty during the evening peak hour without incurring dead mileage on them. This will save dead mileage during the evening also.

There is a necessity of making parking reservation near the Central Secretariat for about 60 buses as pointed out in the earlier chapter. Provision should be made for the parking of D.T.U. vehicles for at least 15 buses each at Connaught Place, Gurdwara Road (Karol Bagh) and University areas, where security of the vehicles can be guaranteed by proper enclosures having both an ingate and outgate.

Optimum location of terminals and bus depots can also cut down the dead mileage appreciably. At present, there are four bus depots: (*i*) Coronation Depot—169 buses; (*ii*) Shadipur Depot—145 buses; (*iii*) Karol Bagh Depot—85 buses; and (*iv*) Vinay Nagar Depot—135 buses.

A new depot at Indraprastha Estate is likely to be opened early in 1959 which will take the place of the Karol Bagh Depot. This being a much needed depot in the eastern area of Delhi, its capacity will be of 190 buses which will reduce the load on the other three depots bringing Vinay Nagar and Coronation to 100 buses each, and Shadipur down to 130 buses, thus reducing congestion in the present depots for better operation. The new depot will have an area of 6 acres and is being built at a cost of Rs. 15.62 lakhs.

Besides these depots, there seems to be a necessity of sub-depots so that the early morning or late night buses could be parked there. Each sub-depot should have a parking capacity of about 75 buses. About 4 acres of land should be sufficient for this type of a sub-depot. To cut down the dead mileage on late night and early morning services, such sub-depots are required in Tilak Nagar (Najafgarh), Shahdara, and Jangpura. Land should be reserved in these areas for this purpose. Such sub-depots will also relieve congestion on main depots when the target of 731 buses fleet is attained by March 1961.

As the number of buses increases, the number of depots at suitable locations should also be increased. Planned operation is 540 buses per day by the end of March 1961 as against 400 buses at present. If an adequate number of depots at suitable locations is not provided, difficulties of storage and servicing would also arise besides the problem of dead mileage. There is a need of one depot for every additional 100 buses and one sub-depot for every additional 50 buses. Each depot serving suburban area necessitating early morning and late evening trips would require a sub-depot within its area of operation so located where it can save maximum dead mileage. Each sub-depot should be preferably within 5 miles from its parent depot.

D.T.U. drivers and conductors who are on early morning or late night duties are given the privilege of a free ride from their homes to the points of duty. Three buses from three different depots run for this purpose every morning and night. The total bus-mileage covered every day for this purpose is 500, which means an expense of over Rs. 500 per day for which there is no return. This dead mileage (*i.e.*, mileage for which there is no revenue) can be cut down by providing residential accommodation for drivers and conductors at the depots and sub-depots.

It would be ideal if accommodation at each depot could be provided for as many conductors and drivers as there are duties. But due to lack of space this has not been possible in the past. Shadipur depot has 240 duties and the residential quarters there are only for 50 drivers and 50 conductors. Due consideration to accommodation problem should be given for future depots. Since it is not possible to provide accommodation to all drivers and conductors at their respective depots, due to lack of space, an effort should be made to provide residential quarters for at least early morning and late night duty drivers. This would eliminate the necessity of incurring 500 dead bus-miles every day—if not completely, at least partially.

Another way of cutting down dead mileage on buses and improving service could be to create bus stations which are not in existence in Delhi at present. Bus stations, from where a number of services radiate, should have the facilities of waiting room, drinking water, tea shops, urinals and a small office for operational control where tickets may be sold in advance and public complaints may be received. There is a necessity of such bus stations at (*i*) Fountain, (*ii*) Madras Hotel, (*iii*) Central Secretariat, (*iv*) Connaught Place (between Parliament Street and Queensway), (*v*) Vinay Nagar, and (*vi*) Gurdwara Road—Karol Bagh.

LOW INCOME ROUTES

Along with unprofitable hours of work, D.T.U. has to cope with unprofitable routes also. Average running cost per bus-mile was Rs. 1.05 during the year 57-58 and the average earning per bus-mile was analysed for the same year and is given below.

Average earning per mile on different routes

Routes	Average earning per mile during the year 57-58	Routes	Average earning per mile during the year 57-58
	Rs.		Rs.
1	1.09	17	1.16
2	1.35	18	0.97
3	0.96	19	1.23
4	1.13	20	1.20
5	0.82	21	1.35
6	1.01	22	1.37
6-A	0.94	23	0.82
7	1.17	24	1.29
8	1.22	25	1.27
9	1.15	26	1.13
10	1.15	27	1.22
11	1.61	28	1.00
12	0.97	29	0.99
13	1.08	30	0.82
14	1.07	Students Special	0.64
15	1.06	M.Ps. Special	0.90
15-A	1.21	Special Hire	2.29
16	0.96	Tourist Special	3.00

The table showing the revenue per bus-mile gives a clear picture of routes which are revenue-earning. However, there are some routes which earn less than the expenditure figure and the reason for this is private operators' competition. In the case of route numbers 1, 16, 18, 23 and 29 there is competition from the buses of private operators who, against the rules, pick up and drop passengers at all the D.T.U. bus stands at proportionately lesser charge than the charge of D.T.U. Route No. 30 operated from the Odeon via Central Secretariat to Kalkajee is entirely for Government servants and, due to low rated fare structure, this route is also uneconomically operated.

A knowledge of schedules, such as running time, frequencies, lay-over, rest period, conditions of service, hours of employment, change-over periods, utilization of vehicles and the number of vehicles that can be operated from any unit, are factors which have to be studied before a planned operation can be decided upon. Preliminary surveys and information which can be readily interchanged in the interest of both the travelling public and the operator is invaluable for study before actual figures of buses and staff, etc., are worked out. Other aspects affecting operation like staggering of working hours, timings of schools, opening and closing of factory hours, peak hour traffic, congregation of passengers at important loading points, quick clearance of long queues together with an attempt to attract and induce bus travel, and also factors which determine the type of operation to meet the demand. Other important considerations in route planning are construction of bus stations, passenger waiting sheds, amenities to passengers, the correct choice of stages and request stops, turning round of buses, off street parking to avoid congestion and obstructions, alternative roads and loops to avoid bottlenecks, provision of suitable recesses or lay-bys for safety in droppig down and picking up passengers. There cannot be any final solution in route planning and one has to be constantly on the look-out to examine the possibility of providing for additional traffic and improvements in the services to retain patronage by varying frequencies to suit requirements and projecting routes into residential and heavy loading-point areas.

There is a definite need of a planning section in the D.T.U. department. This section requires to be under the control of qualified and trained personnel for the job. The main functions of this section should be to carry out field surveys of public requirements, heavy loading and unloading points, service frequency and passenger carrying capacity, etc. Analysis of field data and statistics, co-ordination of routes and assessment of traffic potentialities with a view to making the routes more profitable should also be the job of the planning section.

Tourist special and special hire buses bring the highest income per bus-mile, but the total income on these is very low. An effort should be made to raise this income. Sight-seeing bus schedules are given in Appendix IV. At present, the D.T.U. operates only two vehicles on Sundays and other holidays for sight-seeing purposes. Sight-seeing tours earn the highest profit during winter months. Sight-seeing tours should be extended to Agra, Bhakra-Nangal and other near places of interest. For this purpose, a special type of buses will be required to attract most of the passengers who, for want of such buses, have to go by D.L.Z. taxi cars.

LOW AVERAGE SPEED

The average speed of buses in Delhi is only 12 miles per hour, which is very low. In London, a survey was carried out and it was calculated that if the average speed of the public transport could be raised by one mile per hour, it would result in a saving of £2 million per annum. There is every reason to believe that in Delhi too, if the average speed of buses is raised, it would result in great financial saving every year. Analysis of the causes of congestion is important to improve the average speed.

A study of the crowded routes of Delhi was made with a view to find out the causes of congestion. The most crowded places in Delhi from traffic point of view are Queens Road, Fatehpuri Chowk, Tis Hazari, G.T. Road, Subzimandi, Birla Mandir, G.B. Road, Ajmere Gate, Qutab Road up to New Delhi Railway Station, Paharganj, Sadar Bazar, Pul Bangash, Jamuna Bridge, Roshanara Road, Rohtak Road to Fountain *i.e.*, Model Basti, Ice Factory, H.C. Sen Road. The main reasons for congestion in these areas are (*i*) narrow roads; (*ii*) bad intersection; (*iii*) lack of space or lay-by for buses to stop; (*iv*) slow-moving traffic, specially bullock carts, loading or unloading or moving on the road during rush hours; (*v*) tongas, cycle rickshaws, cycles, motor-cycle rickshaws, all crowding together and fighting for street space with complete disregard for others' right of way; (*vi*) careless pedestrians pushed down to main roadways by barbers and hawkers who occupy the sidewalks wherever they exist; (*vii*) trams; (*viii*) poor practices in parking of vehicles, specially trucks and bullock-carts in certain congested areas like Naya Bazar, Roshanara Road; (*ix*) heavy rush of cyclists during the peak hour on certain roads like Shankar Road; (*x*) stands of private buses as on Queens Road; and (*xi*) bus stops blocked by standing tongas or motor-cycle rickshaws looking for passengers.

Attention should be given first to remove congestion from these areas. This congestion is not only a loss to the D.T.U. buses but all other types of traffic as well. These problem areas should be referred to a traffic specialist for finding a solution based on scientific studies.

CONSIDERATION DIRECTLY AFFECTING BUS USERS

Most of the D.T.U. bus stops do not provide any shelter from rain and sun nor there is any seating arrangement for waiting passengers. Recently, a new design for bus stops, providing shelter from rain and sun with seating arrangement, has been approved by the DDPA. Each bus stop is estimated to cost Rs. 1,000, and Rs. 33,000 has been provided for such shelters. Giving shelter to waiting passengers is important and shelter from the sun is most needed in open areas where there are no trees or other shade, particularly in the newly developing localities.

It has been found that passengers have to wait long for a bus, not necessarily because it might be running late, but more so because most of the passengers are not aware of the time-table of the buses. Each bus stop should be posted with a time-table of the buses passing through that stop. At present such bus schedules are posted only on major bus stops.

Location of bus stops is important both from public point of view and from the D.T.U.'s own interest. Too many stops reduce the average speed of the buses and, with too few bus stops patronage is lost. On principle, stage-to-stage bus stops should be located at a distance not less than one mile. In crowded urban areas or residential areas, where the demand is more, the number of bus stops should not be more than two per mile, *i.e.*, one stage stop and one request stop. This will give the passengers a walking distance of not more than 1/4th of a mile, which seems reasonable. More than two bus stops should be provided under very exceptional circumstances as they would materially affect the average speed of the buses. Location of bus stops on bus routes should be revised in accordance with the above-mentioned standards.

Bus stops opposite each other cause obstruction to the other traffic when these stops are occupied by buses. Bus stops should be so staggered that after stopping and picking up passengers buses move away from each other for opposite directions.

Route numbers should be properly displayed on the top front and top rear of the buses for the guidance of passengers. Otherwise, much inconvenience is experienced

when looking for the bus of a particular route. This generally happens due to negligence of conductors or drivers who are responsible to show the number of the route they go on. The problem should receive the attention of the authorities and a drive made to educate the staff accordingly.

When a particular bus goes out of order and is missing from the route, it causes great inconvenience to waiting passengers, particularly during peak hours. The load of this bus has to be taken by other buses which are already taxed to full capacity. This results in a backlog of passengers waiting impatiently to catch every bus that passes on that route. Queues are broken. Buses are overloaded against conductors' wishes. The overloaded buses are driven to the police station where further delays are caused, but the responsibility cannot be pinned down on any particular passenger. To avoid these difficulties, it is very necessary that when a particular bus goes out of order another bus from reserve stock should immediately replace it.

Drivers do not come in direct contact with the public, but their driving habits do have an effect on the public. A driver can cause inconvenience to public by starting or stopping the vehicle abruptly. Accident risk is involved by his bad driving. This risk is not only for the riding passengers but also for other vehicles and for pedestrians on the road. The behaviour of the D.T.U. drivers has been studied as far as their effect on the public and other traffic is concerned. It has been found generally satisfactory except for their parking and turning habits. Drivers do not necessarily park close within 8″ to 12″ to the curb or in the lay-by. Their stopping of buses on the roadway blocks the other traffic on the road. This unnecessary obstruction to other traffic can be avoided if drivers strictly obey the instruction to stop in the lay-by or close to the curb. But drivers cannot be solely blamed for not stopping in the lay-by as quite often these lay-bys are occupied by motor-cycle rickshaws or tongas hunting for passengers out of the waiting queues for buses. At such places, drivers are obliged to park outside the lay-bys. This not only hampers the flow of other traffic on the road, but waiting passengers also have to break the queues to catch the bus stopped outside the lay-by.

On some intersections, due to lack of space or narrow turning radius, buses cannot keep to the left while turning. Sometimes the buses have to cut across from the right side of the island. This involves accident risk. Such intersections should be improved to the minimum standards.

To eliminate these difficulties, it is desirable that (*i*) drivers must be given strict instructions to stop the buses within 8″ of the left curb of the roadway or on the shoulder of those roads which have no curbs; (*ii*) lay-bys should be strictly kept clear of motor-cycle rickshaws, tongas, etc.; (*iii*) it is necessary to redesign many such intersections which need immediate improvement.

Conductors come in direct contact with the public and often there are complaints on either side. From the side of the public the complaint is about the rudeness of conductors, and from that of the conductors the complaint is about the misbehaviour of passengers (*i*) in forcing their way up in a bus when it is already loaded to the capacity; (*ii*) in not forming queues and in getting in the bus in a haphazard manner; (*iii*) in not buying tickets, especially when there are standing passengers and it is difficult for conductors to reach every passenger; (*iv*) in passengers sometimes offering a five-rupee note for a ticket and demand change. Student passengers create a special problem by teasing the conductors, avoiding to show the students' pass and dodging in payment of the appropriate fare.

The D.T.U. authorities are doing their best to improve the behaviour of the conductors with passengers. Conductors are given courtesy training before they

are put on duty. Also, while blaming conductors for their misbehaviour with passengers, it must be kept in mind that a conductor, during his eight-hour duty, has to deal with 600 passengers on the average. If passengers do not behave properly, conductors are likely to get irritated.

The public can help much in solving this problem, but somehow this is not done to any appreciable extent. Bad elements are always hard to handle and in the main they are the cause of this problem. On bus stops where a queue is not formed or when it is broken on arrival of a bus, it becomes difficult for the conductor to judge as to who was the first in line. Blame is often transferred to the conductor for not taking the deserving passenger. D.T.U. supervisory staff has been posted on some crowded bus stops in an effort to eliminate this difficulty.

To improve students' behaviour and ticketless travel in buses, it is necessary to have a whole-time mobile magistrate and a squad of police at important bus stops. They can deal also with conductors who misbehave. Employing women conductors may reduce this problem to a certain extent.

Bus fares have been revised recently in terms of naye Paise. The new rates stand well in comparison with the fare rates recommended for Calcutta city by a recent enquiry commission. The following table shows the comparison between Calcutta, Delhi, Bombay and Madras bus fare rates.

Bus fare structure for Calcutta, Delhi, Bombay and Madras

(Fare in naye Paise)

Exceeding Miles	Not Exceeding Miles	Calcutta	Delhi	Bombay	Madras
0	1	7	5	7	7
1	2	7	10	10	10
2	3	10	15	15	13
3	4	13	20	15	16
4	5	16	25	20	19
5	6	19	25	25	22
6	7	22	30	25	25
7	8	25	30	30	28
8	9	28	35	30	31
9	10	31	35	35	
10	11	34	40	35	
11	12		40	40	
12	13		45	45	
13	14		45	45	
14	15		50	50	
15			50		

Delhi bus fares may sound high, but looking at the operational cost the fares seem to be satisfactory. Operation cost per bus mile is Rs. 1.05, which means that a bus should be carrying at least 25 to 30 passengers at any one time to pay back the operational cost. During non-rush hours, buses run very thinly loaded. These new

revised rates are a reduction over the previous rates and an annual loss of Rs. 9 lakhs is estimated in revenue by this reduction.

Concession tickets are issued to regular passengers on a monthly basis. Students' concession passes are also issued. Free travelling is permitted to the blind, the staff and the Delhi Corporation Councillors.

It is difficult to correctly assess the loss in revenue due to leakage, but it does exist and it calls for better civic sense. Leakage is due to both conductors and public. On the side of the public it is due to (*i*) non-purchase of tickets, *i.e.*, avoiding payment by evading the conductors; and (*ii*) purchasing tickets of lesser denomination, *i.e.*, paying for lesser distance than travelled. Similarly on the conductors' side it is due to (*i*) not issuing tickets after collecting fares from passengers; (*ii*) issuing lesser denomination tickets after collecting the scheduled fare. The D.T.U. is also cheated by conductors' and passengers' collaboration when no ticket is issued and half of the actual fare goes in the conductor's pocket. It is important to eliminate this loss. This loss, if not completely eliminated, can be reduced appreciably by (*i*) making a public campaign inviting the attention of the travelling public for paying the correct fare, for demanding the correct fare tickets and for keeping an eye on conductors and passengers in collaboration on sharing the fare money; (*ii*) giving powers to the senior grade inspection staff to charge penalty fares to the ticketless passengers on the same basis as in the railways; (*iii*) the help of a mobile magistrate; (*iv*) severe action against conductors when caught; and (*v*) constant vigilance of officers and special squads operating in the zones throughout the day.

It has been noticed that the D.T.U. buses give out a thick cloud of smoke while running on the roads. This smoke is a great nuisance not only to the traffic behind the buses but also to a wider section of public particularly in business and shopping areas.

VII

DTU (DTS) FINANCE

The Delhi Transport Undertaking has been gradually expanding on loans taken from the Central Government every year. The Delhi Road Transport Authority took over from the Ministry of Transport on 1st April, 1950 and the liability for the capital assets was provisionally treated as Rs. 28.17 lakhs. This has now been revised to Rs. 38.13 lakhs. The amounts of loans advanced by the Central Government and repayments made by the DRTA from year to year are as follows :

Loans taken and the rate of interest and payback instalments for the years 1950-58

Year	Amount of Loan	Rate of interest	Payback instalments have been made as under	
	Rs.		Rs.	
1950-51	20,00,000	3¼%	..	Re-payable in 10 equal instalments
1951-52	20,00,000	4.125%	2,00,000	
1952-53	35,00,000	4¾%	4,00,000	
1953-54	45,00,000	4¾%	6,33,334	
1954-55	35,00,000	4¾%	9,33,334	
1955-56	10,00,000	4¾%	11,66,668	
1956-57	55,00,000	4½%	21,66,669	
1957-58	50,00,000	4½%	8,50,000	
	2,70,00,000		63,50,005	
Total loan taken till 31.3.1958		Rs.	2,70,00,000	
Repayment made up to 31.3.1958		Rs.	63,50,005	
	Total Debt	Rs.	2,06,49,995	

Loans drawn from the Central Government from year to year are repayable in a stipulated number of equal annual instalments of principal along with simple interest.

The revenue expenditure statement for the year 1957-1958 shows a profit of Rs. 529,800. The break-up of income and expenditure is shown hereunder:

Break-up of Income & Expenditure for the year 1957-58

Income		
Traffic earnings		1,54,94,500
Advertisement and publicity		1,20,000
Sale of unserviceable stores and scrap		50,000
Rent, rates and taxes		3,000
Other receipts on account of forefeiture of passes, sale of tender forms and training fee, etc.		70,000
	Rs.	1,57,37,500

Expenditure		
Pay and allowances		
Administration	3,72,500	
Operation	35,63,500	
Rep. & Mtc.	12,40,100	
		51,76,100
P. O. L. (Petrol, Oil, Lubricant)		29,00,000
Stores, spare parts, tyres and tubes		18,24,000
Insurance charges		81,100
Interest charges		9,19,500
Depreciation charges		29,60,000
Misc. expenditure		13,47,000
	Rs.	1,52,07,700
Total income	1,57,37,500	
Total expenditure	1,52,07,700	
Surplus or profit	Rs. 5,29,800	

This small annual profit is not satisfactory. It may be noted that a huge sum of money, *i.e.* Rs. 9,19,500, was paid as interest charges.

Much as it is desired that the D.T.U. should be self-supporting, it is not feasible. Subsidy from the Government is justified on the ground that benefits of such transportation service go not only to the rider but also to enhance property value and general welfare of the city.

VIII

DELHI TRAMWAYS

Tramcars were put on the road in Delhi on June 2, 1908. They have now completed 50 years in operation. They are age-worn and difficult to maintain and require to be replaced as they cannot operate as public service vehicles very much longer. Two more American type cars were added to the fleet in the year 1924, raising the total to 26. This fleet was augmented by 3 trolley buses in February 1935 and in the same year the Delhi Tramways under D.E.S. & T. Co. commenced the operation of 9 petrol buses which ran till the 30th of November, 1940, after which the 9 petrol buses were disposed of. In the year 1954, six tramcars and one trolley bus were scrapped, reducing the fleet to 20 tramcars and two trolley buses. Today there are 12 tramcars and 2 trolley buses on the road and it is hoped to rebuild 3 more to further augment the present tramcar fleet.

The tramcars cater for the transport requirements of the area bounded by the city wall known as Delhi City. The area of operation of the Tramways is from Jama Masjid to Sadar Bazar and Jama Masjid to Subzimandi. Since the inception of the services to date, route mileage is 5.36 and the total track mileage, including loops and crossings, is 9. The trolly bus route mileage is 2.5. The company functioning under the name of Delhi Electric Tramways Lighting Company till 1928 when it was renamed as Delhi Electric Supply and Traction Company Limited. On March 2, 1947, the Government took over from the D.E.S.T. Company and handed over the undertaking to the Delhi Central Electric Power Authority, but it remained under the administrative control of the Central Government through the Ministry of Irrigation and Power. Later, the Tramways were transferred by Government from the DCEPA to the Delhi Road Transport Authority on April 1, 1951 and, as it was made the statutory obligation of the DRTA to provide road transport service in the State of Delhi, the DRTA had decided to close down the Tramways in March 1956, but this decision was revised in December 1955 and the life of the Tramways was extended for a further period of 3 years till March, 1959.

The value of the assets of the Tramways as on April 1, 1951 was Rs. 10,15,084; after depreciation this value is now offset at about Rs. 5,60,000. Through the passage of time, the staff of the Tramways has been reduced from its original figure of 350 to 268 and it is now further intended to reduce this figure to about 145 men, allowing about 12 men per car. The Tramways Organisation over the last two years has been run at a deficit, which is being met from the revenue of Buses Division. The resultant decline has been due to a number of reasons, mostly tied up with the non-availability of essential spares and the maintenance of age-old tramcars for which spares are not readily available but have had to be manufactured resulting in the curtailment of the operative life of each overhaul. The main movable parts such as pinions and gears are not available in the country and the trams had to carry on with these parts welded; this does not give a true pitch when the pinions and gears are meshed and affects the life of the motors and other electrical equipment. Due to these conditions and the increased congestion in the city, the speed of the tramcars has been considerably reduced and the present average speed is 3 miles an hour. This again has cut down the scheduled mileage to a very great extent, resulting in loss of revenue.

There is no doubt that Tramways should be eliminated. But sudden elimination of this service, which carries over 20,000 passengers every day, without any other mass

transport means is likely to draw motor-cycle rickshaws, two-seater scooters, tongas, cycle rickshaws, etc., to carry the same passengers, which will crowd up the already congested areas of Chandni Chowk, Sadar Bazar, and Subzimandi. Some local public transport service will have to be evolved which may run between Chandni Chowk and Subzimandi and serve as a feeder to the bus routes operating north and south or east and west on streets which permit bus operation. As a tentative measure, it is suggested that a low-powered tractor having a suitably designed articulated vehicle for carrying passengers at about 8 to 10 miles per hour may be tried.

IX

FUTURE PLANNING AND TRANSPORT PROBLEM

The transport needs of Delhi are closely related to the future of Delhi itself. Any major changes in the size and distribution of population of Delhi would produce corresponding changes in the demands made on transport. The effects of haphazard and unplanned growth are apparent. But, wholesale replanning of Delhi now is neither possible nor it can bring about revolutionary changes in the official, industrial, social, domestic or general pattern of Delhi. However, well-planned control on future growth of Delhi will certainly reduce the factors that have been instrumental in the unrelated and haphazard transport demands of the past.

Good planning in Delhi should aim at limiting the size of the city. The limiting radius of travel-time and distance should be taken as the bases for town and transport planning. Any possible reduction in the radius of travel-time or distance would result in more comfortable and convenient travel. Drift of population to the outer areas and increase in activity increase the load on transport. The improvement of transport conditions rest considerably on an improved residential distribution than on any fundamental change in distribution pattern. Effort should be made to reduce the distance of the movement from home to work which is the main movement on Delhi roads.

Delhi planners should now concentrate on arresting the further worsening of the transport problem, firstly, by attempting to decrease the length and number of trips by good land-use planning and integrated block-development aimed at bringing together homes, schools, small-scale manufacture and shopping centres; secondly, an attempt should be made to diffuse the load in core area roads by decentralizing centres of employment. The latter includes the establishment of industrial districts on the outskirts with new housing nearby and moving certain government offices to outlying points away from the main office concentration area (as shown in the map in Appendix I) *i.e.*, around the Central Secretariat. Here it should be noted that over 45% of all employment in Delhi is governmental. Thirdly, provision should be made for loops (roads) to carry vehicles around congested core areas in cases where the origin and destination of persons is outside of such core areas. Fourthly, provision should be made for cycle expressways leading to the office concentration area of New Delhi, *i.e.*, the Central Secretariat and the near around area. These cycle expressways, completely segregated from the main carriageways, should be short-cuts on existing roads to cyclists and should originate from Vinay Nagar, Karol Bagh, Rajendra Nagar, Subzimandi, Paharganj and Gole Market, wherefrom the maximum cycle traffic comes to the office area. This will improve the general traffic conditions on the road. (See map, Appendix I, showing travel lines to the office area.) Further, there should be a prohibition of further concentration of offices in the office concentration area near the Central Secretariat. Large movement along the Ring Road should be encouraged by locating important centres on that road and giving easy connections between the place of residence and the place of work.

X

SUMMARY OF RECOMMENDATIONS

Office hours in the office concentration area (list of offices in the OCA given in Appendix II) should be staggered by one hour. The offices on the side of Kingsway (Rajpath) may be opened at 9-30 A.M. and those on the south side of Kingsway may be opened at 10-30 A.M. or vice versa.

Parking reservation for about 60 buses should be made within the OCA, preferably at three different locations.

To reduce the dead mileage on buses, sub-depots are required in Tilak Nagar, Shahdara and Jangpura.

For future expansion of the D.T.U., and to avoid the unnecessary dead mileage, there is a need of one depot for every 100 additional buses and one sub-depot for every additional 50 buses. Each sub-depot should be within 5 miles from its parent depot, so located as to save the maximum dead mileage.

Residential accommodation for drivers and conductors should be provided at all depots and sub-depots. Where it is not possible to provide accommodation for all drivers and conductors, residential quarters should be provided for early morning and late night duty staff. That will go a long way in cutting down the unnecessary 500 dead miles per day.

Bus stations should be provided at (*i*) Fountain, (*ii*) Madras Hotel, (*iii*) Central Secretariat, (*iv*) Connaught Place, (*v*) Vinay Nagar, (*vi*) Gurdwara Road—Karol Bagh.

There is a definite need of a planning section in the D.T.U. This section should be under the control of qualified and trained personnel for planning the routes and service frequencies in accordance with the requirements of the public and of economical operation.

Sight-seeing tours by D.T.U. buses should be extended to Agra, Bhakra-Nangal and other surrounding areas since the sight-seeing buses are highly profit-earning.

Special attention should be given to remove congestion from the traffic point of view from the following areas—Queens Road, Fatehpuri Chowk, Tis Hazari, G.T. Road, Subzimandi, Birla Mandir, G.B. Road, Ajmere Gate, Qutab Road up to New Delhi Railway Station, Paharganj, Sadar Bazar, Pul Bangash, Jamuna Bridge, Roshanara Road, Rohtak Road to Fountain, *i.e.*, Model Basti, Ice Factory, H.C. Sen Road. Low average speed due to congestion is a great loss to the D.T.U. every day.

Even in crowded urban areas the number of bus stops should not be more than two in a mile, *i.e.* one stage stop and one request stop.

D.T.U. authorities should make a special drive for giving strict instruction to the bus conductors to keep the boards bearing the route number and other information always well fixed and well lit on the buses both on front and back sides. Great inconvenience is caused to the public with this information missing on the buses.

D.T.U. authorities should make special arrangements to immediately supply a bus from the reserve stock when a particular bus goes out of order. The 'missing bus' nuisance should be avoided.

Drivers must be given strict instructions to stop the buses within 8″ to 12″ of the curb or on the shoulder where there is no lay-by or curb.

Enforcement action is necessary to keep the lay-bys clear of the tongas, motor-cycle rickshaws or other hire transport vehicles.

There are many narrow roads and intersections where buses cannot manoeuvre this operation properly. On a number of intersections buses cannot go around the central island and thus do not keep to the left on turns. All such intersections should be improved immediately to avoid accident dangers.

To improve students' behaviour and reduce ticketless travel on buses, a whole-time mobile magistrate with a squad of police is recommended.

There is loss due to leakage and pilferage every day. This loss can be appreciably reduced by inviting the attention of the travelling public for paying the correct fare, for demanding the correct fare ticket and for keeping an eye on passengers and conductors sharing the fare money.

Senior grade Inspectors should be given powers to charge penalty fare to the ticketless passengers on the same basis as in the railways.

Use of a dial machine with every conductor is recommended. With this method of issuing tickets, there are less chances of leakage in revenue as the conductor has to dial the denomination for which the ticket is issued.

The Delhi Transport Undertaking should be subsidized by the Government.

Delhi tramways must be replaced by some other means of transport.*

Delhi's town planners should attempt to decrease the length and number of trips by good land-use planning and to diffuse the load in core area roads by decentralizing centres of employment.

Loop roads should be provided to carry vehicles around congested core areas.

Cycle expressways should be provided leading to the office concentration area (marked on map, Appendix I) from Vinay Nagar, Karol Bagh, Rajendra Nagar, Subzi-mandi, Paharganj and Gole Market areas. The cycle expressways should be completely segregated from the main carriageways and should be short-cuts on existing roads for cyclists.

No further concentration of offices should be permitted in the OCA (shown on the map, Appendix I).

Bus sheds should be made on a priority basis in the newly-developed colonies where there are no trees or any other source of shade from sun in summer time for the waiting passengers.

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* Report of a committee to study the problem of removal of tramways has been submitted some time ago.

Besides staggering of bus stops on roads, it is necessary that they are so located that buses using them do not unsight the traffic flow from side roads to main road and also that buses for opposite directions are driven away from each other after picking up passengers from the bus stops.

GOPI NATH AMAN

L. C. KRIPALANI

V. K. N. MENON

TEJBIR KHANNA

APPENDIX II

List of Offices in the O.C.A., along with their grouping, where the questionnaires were circulated

Government Office Group	Government Offices	Location
1.	C.P.W.D., Pay Commission, Cabinet Sectt., President and Bodyguard, Ministry of Finance, Ministry of Health, Ministry of Irrigation and Power, Ministry of Law, Directorate of Communications, Department of Education, Dept. of DGHS, Ministry of Railways, Ministry of WHS and Partition Sectt.	North Block, Church Road, President Estate.
2.	Defence, Department of Economic Affairs, P.I.B., Directorate General, Sugar and Banaspati, Parliament Secretariat, Ministry of Parliamentary Affairs, Supreme Court.	P. Block, Raisina Road, Parliament House.
3.	D.G.R.E., Chief Labour Commissioner, Directorate of Civil Aviation, Revenue Department, Company Law Administration, Director of Audit, Defence Offices.	A.I.R., Talkatora Road, Gurdwara Road, Mahadeo Rd., Parliament Street.
4.	Ministry of Food and Agriculture, Department of Food, Dept. of Agriculture, Ministry of Community Development, N.B.O., Directorate of Commercial Audit, National Archives.	H Type Bldg., Extension Old Mill Road, Queen Victoria Road, North Central Vista.
5.	Ministry of Home Affairs, Defence Offices.	South Block, Dalhousie Road, A.B. Hutments.
6.	Defence Offices.	E, F, G, H, L & J Blocks & Hastings Rd.
7.	Defence Offices, etc.	Kashmir House, C1, C2 & Q Blocks.
8.	Ministry of Commerce & Industry, Planning Commission, Dept. of Iron and Steel, Dept. of Accountant General, C & I, Chief Controller, Exports and Imports.	Vygyan Bhavan, Udyog Bhavan, H Type Bldg.
9.	Pay & Accounts Offices, Ministry of F.A., Chief Audit Officer, Food, Rehabilitation and Supply, Ministry of Rehabilitation and Dept. of I & B., Ministry of Transport & Communications, U.P.S.C.	Akbar Road, Mansingh Road, Jamnagar House, Dholpur House, Kotah House.

10.	Dept. of I & B and DGSD., Printing and Stationery, WHS, Survey of India, C.W. & P.C., Ministry of Law, Ministry of Defence.	Shahjahan Road, Bikaner House, Alwar House, Jodhpur House.
11.	Northern Railway, Ministry of C. & I.	Baroda House, Canning Road, C.P.W.D. Travancore House, Lytton Road.
12.	Dept. of Archaeology, Accountant General and Central Revenues.	Pataudi House, Kalsia House.
21.	C.P.W.D., Director of Audit, Defence Services, Director General, Registration & Employment.	Irwin Road, Gurdwara Road.
22.	Military Offices around G.P.O.	Gole Market.
23.	State Bank of India and N.D.M.C.	Parliament Street.
24.	Secretariat Training School, National Sample Survey and Craft Board, Directorate of Postal Services, District Manager, Delhi Telephones.	Queensway.

Note : Office groups 13 to 20 (both inclusive) are not given here as the offices in those groups fell outside the Office Concentration Area (O.C.A.).

APPENDIX IV

Sight-seeing Bus Schedules

DELHI ROAD TRANSPORT AUTHORITY
Scindia House, New Delhi

DELHI SIGHT-SEEING TOUR NO. 1

Time : 4 hours (9 A.M. to 1 P.M.)
Mileage : 11 miles.
Area : Delhi sites of tourist interest
Fare : Rs. 1.50 nP.

Name of the historical site to be visited	Route to be followed	Mileage	Journey time	Sight-seeing time
1. Raj Ghat	Tourist Office, Barakhamba Road, Hardinge Bridge, Indraprastha Road, Ring Road, Raj Ghat.	4	9.00 A.M. to 9.20 A.M. (20 Mts.)	9.20 A.M. to 9.50 A.M. (Halt at Raj Ghat for 30 Mts.)
2. Red Fort	Power House Road, Faiz Bazar, Elgin Road, Red Fort.	2	9.50 A.M. to 10.00 A.M. (10 Mts.)	10.00 A.M. to 12.00 Noon. (Halt at Red Fort for 2 Hrs.)
3. Jamid Mosque	Red Fort, Elgin Road, Jama Masjid Road, Jama Masjid.	1	12.00 Noon to 12.15 P.M. (15 Mts.)	12.15 P.M. to 12.45 P.M. (Halt at Jama Masjid for 30 Mts.)
4. Back to Regional Tourist Office	Jama Masjid Road, Elgin Road, Faiz Bazar, Circular Road, Minto Road, Connaught Circus.	4	12.45 P.M. to 13.00 P.M. (15 Mts.)	
	Total :	11 Miles	1 Hour	3 Hours

DELHI ROAD TRANSPORT AUTHORITY

Scindia House, New Delhi

DELHI SIGHT-SEEING TOUR NO. 2

Time : 4 Hours (2.00 P.M. to 6.00 P.M.)
Mileage : 23 Miles
Area : Historical sites of tourist interest in New Delhi
Fare : Rs. 2.00

Name of the historical site to be visited	Route to be followed	Mileage	Journey time	Sight-seeing time
India Gate	Drive Past, A.I.R., Reserve Bank of India, Parliament House, Central Sectt., Rashtrapati Bhawan, Rajpath.	3	2.00 P.M. to 2.15 P.M. (15 Mts.)	2.15 P.M. to 2.25 P.M. (Halt at India Gate for 10 Mts.)
Humayun's Tomb	Sher Shah Road, Drive Past, Purana Quila, Mathura Road.	2	2.25 P.M. to 2.30 P.M. (5 Mts.)	2.30 P.M. to 3.10 P.M. (Halt at Humayun Tomb for 40 Mts.)
Qutab Minar	Lodi Road, Safdarjang, Mehrauli Road.	6	3.10 P.M. to 3.35 P.M. (25 Mts.)	3.35 P.M. to 4.35 P.M. (Halt at Qutab for 1 hour)
Birla Mandir	Mehrauli Road, Tughlak Road, Church Road, North Avenue, Reading Road.	10	4.35 P.M. to 5.10 P.M. (35 Mts.)	5.10 P.M. to 5.50 P.M. (Halt at Birla Mandir 40 for Mts.)
Back to Regional Tourist Office	Reading Road, Gole Market, Lady Hardinge Road, Con. Circus.	2	5.50 P.M. to 6.00 P.M. (10 Mts.)	
		Total : 23 Miles	1½ Hours	2½ Hours

Fare for Both Tours Rs. 3.00. Booking can be made in advance at :

1. The Regional Tourist Office,
   88, Janpath, New Delhi.
2. D.T.U. Scindia House (Traffic Branch),
   New Delhi.

LOCAL SIGHT-SEEING

Date	Bus No.	MORNING TOUR Seating Capacity	Seats Booked	Occupied Seat Percentage of Total	EVENING TOUR Seats Booked	Percentage	Total Passengers	Mileage	Total Income	Income per Bus per Mile	Expend. per Bus per Mile
									Rs.	Rs.	
1.3.58	531	44	16	36.36%	17	38. 6%	33	39	53.50	1.37	1.09
2.3.58	531	44	34	77.27%	46	100%	80	39	128.50	3.29	
8.3.58	531	44	15	34.09%	21	47.72%	36	39	58.00	1.58	
9.3.58	531	44	25	56. 8%	27	61. 5%	52	39	83.00	2.13	
15.3.58	531	44	20	45.45%	30	68.18%	50	39	82.00	2.12	
16.3.58	531	44	47	100%	44	100%	91	39	148.50	3.80	
22.3.58	531	44	13	29. 5%	17	38. 6%	30	39	49.00	1.26	
23.3.58	531	44	47	100%	45	100%	92	39	141.00	3.63	
29.3.58	531	44	30	68.18%	37	84. 1%	67	39	111.50	2.86	
30.3.58	531	44	40	90. 9%	46	100%	86	39	138.50	3.55	
								390	994.00		